



testo 184 · Data logger

Instruction manual



www.testo.com/184manuals

1 Safety and the environment

1.1. About this document

Use

- > Please read this documentation through carefully and familiarize yourself with the product before putting it to use. Pay particular attention to the safety instructions and warning advice in order to prevent injuries and damage to the products.
- > Keep this document to hand so that you can refer to it when necessary.
- > Hand this documentation on to any subsequent users of the product.

1.2. Ensure safety

- > Only operate the product properly, for its intended purpose and within the parameters specified in the technical data. Do not use any force.
- > Carry out only the maintenance and repair work on this instrument that is described in the documentation. Follow the prescribed steps exactly. Use only original spare parts from Testo.

1.3. Protecting the environment

- > Dispose of faulty rechargeable batteries/spent batteries in accordance with the valid legal specifications.
- > At the end of its useful life, send the product to the separate collection for electric and electronic devices (observe local regulations) or return the product to Testo for disposal.

2 Specifications

2.1. Use

The testo 184 data loggers are used to save and read out individual readings and measurement series. They have been specifically designed for monitoring the transportation of products subject to cold chain requirements.

Temperature and humidity readings are saved throughout the entire duration of the measurement program.

Acceleration readings are monitored throughout the duration of the measurement program and saved when the set limit value is exceeded.

Data logger programming and measurement report output are implemented via PDF files, no software needs to be installed.

Product versions T1 and T2 are single-use data loggers with a time-limited service life.

2.2. Technical data

testo 184 T1, T2, T3, T4

| Feature | Values |
|-------------------------------|---|
| Display | T1, T4: no T2, T3: yes |
| Probe type | T1, T2, T3: internal NTC temperature sensor T4: internal PT1000 temperature sensor |
| Measurement channels | 1 internal |
| Measurement parameters [unit] | Temperature [°C, °F] |
| Measuring range | T1, T2, T3: -35 to 70 °C T4: -80 to 70 °C |
| Accuracy | T1, T2, T3: ±0.5 K T4: ±0.8 K (-80 to -35.1 °C), ±0.5 K (-35.0 to 70 °C) |
| Resolution | 0.1 °C |

| Feature | Values |
|--|---|
| Operating temperature | T1, T2, T3: -35 to 70 °C T4: -80 to 70 °C |
| Storage temperature | T1, T2, T3: -35 to 70 °C T4: -80 to 70 °C |
| Battery type | T1: internal, non-replaceable T2: internal, non-replaceable T3: CR2450, replaceable T4: TLH-2450, replaceable |
| Battery life (reusable data loggers) | T3: 500 days (15-minute measuring cycle, 25 °C) T4: 100 days (15-minute measuring cycle, -80 °C) |
| Operating time (single-use data loggers) | T1: 90 days from the first time the program is started (5-minute measuring cycle, -35 °C) T2: 150 days from the first time the program is started (5-minute measuring cycle, -35 °C) |
| Protection class | IP67 |
| Measuring interval | 1 minute to 24 hours |
| Memory | T1: 16,000 readings T2, T3, T4: 40,000 readings |
| Dimensions | T1: 33 x 9 x 74 mm T2, T3, T4: 44 x 12 x 97 mm |
| Weight | T1: 25 g T2, T3, T4: 45 g |
| Directives, standards, certificates | 2014/30/EC, EN 12830, HACCP-certified, temperature calibration certificate traceable according to ISO 17025 |
| Warranty/guarantee | T1, T2: 12-month warranty from the production date, production date: see circled date code (MMDD) on the identification plate. T3, T4: 24-month warranty, warranty terms: see website www.testo.com/warranty |

testo 184 H1, G1

| Feature | Values |
|--------------------------------------|--|
| Display | yes |
| Probe type | H1: internal digital humidity sensor G1: internal 3-axis accelerometer |
| Measurement channels | H1: 2 internal G1: 5 internal |
| Measurement parameters [unit] | H1: temperature [°C, °F], relative humidity [%] G1: temperature [°C, °F], relative humidity [%], acceleration [g, m/s ²] |
| Measuring range | -20 to 70 °C 0 to 100 % (not for condensing atmospheres) ¹ G1: 0 to 27 g |
| Accuracy | ±0.5 K (0.0 to 70 °C), ±0.8 K (-20 to -0.1 °C) ±1.8 % RH + 3 % of the reading (at 25 °C, 5 to 80 %), ±0.03 % RH / K (at 0 to 60 °C) G1: ±1,1,1 m/s ² + 5 % of the reading |
| Resolution | 0.1 °C 0.1 % RH G1: 0.1 g |
| Operating temperature | -20 to 70 °C |
| Storage temperature | -55 to 70 °C |
| Battery type | CR2450, replaceable |
| Battery life (reusable data loggers) | H1: 500 days (15-minute measuring cycle, 25 °C) G1: 120 days (15-minute measuring cycle, 25 °C) |
| Protection class | IP 30 |
| Measuring interval | 1 minute to 24 hours (temperature and relative humidity) 1 second (acceleration) |

¹ For continuous application in high humidity (> 80 % RH at ≤ 30 °C for > 12 h, > 60 % RH at > 30 °C for > 12 h), please contact us via www.testo.com/service-contact

| Feature | Values |
|-------------------------------------|---|
| Scan frequency | 1600Hz (acceleration) |
| Memory | 64,000 readings (temperature and relative humidity) G1: 1,000 readings (acceleration) |
| Dimensions | 44 x 12 x 97 mm |
| Weight | 45 g |
| Directives, standards, certificates | 2014/30/EC, HACCP-certified |
| Warranty | 24 months, warranty conditions: see website www.testo.com/warranty |

3 Product description

3.1. Status LEDs

To increase the battery life, the status LEDs are not permanently illuminated. They flash once every 5 seconds.

In hibernation mode, the status LEDs are disabled.

Alarm

| Feature | LED colour |
|----------|------------|
| No alarm | green |
| Alarm | red |

Battery

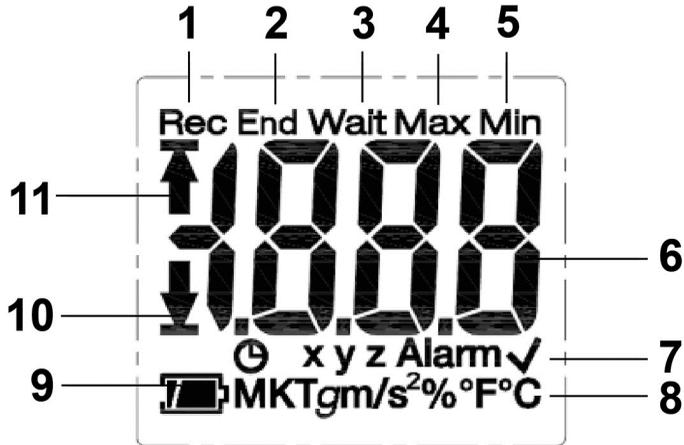
| Feature | LED colour |
|------------------------|------------|
| Battery life > 10 days | green |
| Battery life < 10 days | red |

Mode

| Feature | LED colour |
|--|---------------|
| WAIT mode (wait for program start) | green and red |
| Rec mode (measurement program running) | green |
| End mode (measurement program finished) | red |

3.2. Display (LCD)

Not available for all product versions.



- 1 Measurement program running
- 2 Measurement program finished
- 3 Wait for start of measurement program
- 4 Highest saved reading
- 5 Lowest saved reading
- 6 Reading
- 7 Status information: ⌚ start criterion Date/time programmed/time mark, **xyz** measurement axes for acceleration measurement, **Alarm** set limit value(s) exceeded, ✓ set limit value(s) not exceeded
- 8 Units
- 9 Battery capacity: 🔋 sufficient, 🔌 empty
- 10 Lower limit value exceeded
- 11 Upper limit value exceeded

i For technical reasons, the display speed of liquid crystal displays becomes slower at temperatures below 0 °C (approx. 2 seconds at -10 °C, approx. 6 seconds at -20 °C). This has no influence on the measuring accuracy.

3.3. Key functions

Commissioning

The data loggers are delivered in hibernation mode to prolong the battery life. In this mode, the status LEDs and the display are disabled.

- > Press the **START** key or the **STOP** key.
- **Wait** mode is activated.

START key

- ✓ **Wait** mode and start criterion Button Start programmed.
- > Press **START** key for approximately 3 seconds to start the measurement program.
- The measurement program starts: **Mode** status LED flashes green, **Rec** appears on the display.
- ✓ Product versions with display:
- > Press **START** key to toggle between the displays.

Display sequence (max. display range per version, certain data is not displayed depending on the operating mode):

| Display | T2 | T3 | H1 | G1 |
|---|----|----|----|----|
| Current temperature reading (°C / °F) | X | X | X | X |
| Current average value MKT (Mean Kinetic Temperature) | X | X | X | X |
| Current relative humidity reading (%) | - | - | X | X |
| Current acceleration reading, X axis (x, g) | - | - | - | X |
| Current acceleration reading, Y axis (y, g) | - | - | - | X |
| Current acceleration reading, Z axis (z, g) | - | - | - | X |
| Maximum temperature reading (Max, °C / °F) | X | X | X | X |
| Minimum temperature reading (Min, °C / °F) | X | X | X | X |
| Maximum relative humidity reading (Max, %) | - | - | X | X |
| Minimum relative humidity reading (Min, %) | - | - | X | X |
| Maximum acceleration reading, X axis (Max, x, g) | - | - | - | X |

| Display | T2 | T3 | H1 | G1 |
|---|----|----|----|----|
| Maximum acceleration reading, Y axis (Max , y , g) | - | - | - | X |
| Maximum acceleration reading, Z axis (Max , z , g) | - | - | - | X |
| Time mark (🕒) | X | X | X | X |
| Battery life in days (🔋) | X | X | X | X |

STOP key

- ✓ **Rec** mode and stop criterion Button Stop programmed.
- > Press **STOP** key for approximately 3 seconds to end the measurement program.
- The measurement program ends: **Mode** status LED flashes red, **End** appears on the display.

START + STOP key

The data loggers may be placed in hibernation mode to prolong the battery life. In this mode, the status LEDs and the display are disabled.

- ✓ **WAIT** or **End** operating mode.
- > Press the **START** key and the **STOP** key simultaneously for approximately 3 seconds.
- Hibernation mode is activated.

3.4. Important information and glossary of terms

- **Single-use data logger** (versions T1 and T2): the data logger has a time-limited service life, which begins from the first time the program is started.
- **Start and stop setting**: the criteria for starting and stopping the program are defined in the configuration file. One of the criteria must be selected for starting the program. When selecting the criterion, a time delay can be entered (program starts x minutes after pressing the key). Both criteria can also be selected for stopping the program. The criterion that occurs first stops the program.
- **Measuring interval**: the measurement interval defines the intervals at which readings are saved.
- **Time mark**: time marks can be set for the documentation, e.g. when responsibility is transferred to another institution.

A maximum of 10 time marks can be set. Setting a time mark resets the statistical values **Min**, **Max** and **MKT**.

- **Acceleration** (shock): the (positive and negative) acceleration is measured in 3 measurement axes. Only those readings that exceed the set limit value (maximum value per 1 second) are stored and displayed.

The acceleration readings of the 3 measurement axes are displayed separately on the display of the data logger.

The maximum cumulative value (peak) of the 3 measurement axes is displayed in the PDF report.

- **Report time zone**: defines the time zone to which all time specifications in the measurement report refer. Any time zone changes during the measurement are not taken into account.
- **MKT** (mean kinetic temperature): the MKT is a single calculated temperature. MKT may be considered an isothermal storage temperature. It simulates the non-isothermal effects of storage temperature variations.

Calculation:

$$T_{mkt} = \frac{\Delta E / R}{-\ln \frac{e^{-\Delta E / RT_1} + e^{-\Delta E / RT_1} + e^{-\Delta E / RT_n}}{n}}$$

T_{mkt} = mean kinetic temperature in degrees Kelvin

ΔE = activation energy (standard value: 83.144 kJ/mol)

R = universal gas constant (0.0083144 kJ/mol)

T_1 = average temperature in degrees Kelvin during the first time period

T_n = average temperature in degrees Kelvin during the nth time period

- **MKT activation energy**: the default activation energy is set at 83.144 kJ/mol, as recommended in USP <1160>. If other estimates are available as a result of studies that have been carried out, the activation energy can be customised.
- **Individual alarm**: an alarm is triggered when the set limit value is exceeded.
- **Cumulative alarm** (only for temperature and humidity measurement): an alarm is not triggered when the set limit value is first exceeded, but only once the overall duration, during which limit values are exceeded, exceeds the set waiting period (allowed time).
- **Wall bracket** (delivery includes version G1): for the acceleration measurement, the data logger must be permanently connected to the object to be monitored. Mount the wall bracket using 2 screws or 2 cable ties and then push the data logger into the wall bracket.

4 Using the product

4.1. Configuring the data logger

Showing/changing the configuration

Adobe Reader software (version X or later) is required.

The data logger must not be in **Rec** mode.

1. Connect the data logger to a PC via the USB port.
 - The status LEDs are disabled, **uSb** is displayed (instruments with display). The device drivers are installed automatically.
 - The window **Automatic playback** is displayed.
2. Click on **Open folder to view files**.
 - The file explorer opens.
3. Open the file **testo 184 configuration.pdf**.
4. Make changes to the configuration. Please note:
 - The type of instrument used must be set correctly.
 - Existing configuration data can be imported by clicking on the **Import** button. The configuration data to be imported must be available in XML data format.
 - When using the Configuration Assistant, some functions are predefined or filled in automatically. Expert Mode must be enabled in order to use and manually set all instrument functions.
5. Export changes to the configuration by clicking on the  button on the data logger.
 - A window opens for exporting form data.
6. Select the data logger as the storage location (**Drive TESTO 184**) and export the configuration data by clicking on the **Save** button.
 - The configuration is stored on the data logger as an XML file. The XML file can be used as a template for other data loggers (via copy/paste in the file explorer).
7. Close file.

A message **Do you want to save the changes to “testo 184 configuration.pdf” before closing?** may appear. Answer this question with **No**.
8. Disconnect the data logger from the PC.
 - The logger switches to **Wait** mode, the **Mode** status LED flashes green/red.

Configuring several data loggers with the same settings

Existing configuration data can be stored on the PC and copied to other data loggers.

The configuration file must be available in XML data format, you can select any file name.

- > Copy an existing configuration file to the data logger.

Changing the logo for the measurement data report

A logo is inserted in the measurement data report. This can be customised.

The logo must be available in JPEG data format, the file size should not exceed 5 kB and the file name must be **Logo.jpg**.

- > Create a logo that meets the above criteria and copy it to the data logger.

Configuring the data logger using Testo PC software

Alternatively, the data logger can also be configured using testo Comfort Software Professional (version 4.3 service pack 2 or later) or testo Comfort Software CFR (version 4.3 service pack 2 or later). Please consult the relevant software instruction manual.

4.2. Measuring

Starting measurement

Depending on the configuration of the data logger, the measurement program is started via one of the following criteria:

- Button Start: hold down the **START** key for > 3 seconds.
- Time Start: the measurement starts automatically once the configured time has been reached.
- The logger switches to **Rec** mode, the **Mode** status LED flashes green.

Setting time marks

While the measurement program is running (**Rec** mode), up to 10 time marks can be set. These are used to document the transfer of responsibility, for example.

- > Hold down the **START** key for > 3 seconds.
- The number of set time marks is displayed for 3 seconds and  flashes three times (instruments with display), Mode status LED flashes green/red three times.

Ending measurement

Depending on the configuration of the data logger, the measurement program is ended via one of the following criteria:

- Button Stop: hold down the **STOP** key for > 3 seconds.
- Time Stop: the measurement stops automatically once the configured time has been reached.
- The logger switches to **End** mode, the **Mode** status LED flashes red.

4.3. Reading out data

Displaying a measurement data report

Adobe Reader software (version 5 or later) or compatible software is required to display PDF/A files.

1. Connect the data logger to a Windows PC via the USB port.
 - The status LEDs are disabled, **uSb** is displayed (instruments with display). The device drivers are installed automatically.
 - The window **Automatic playback** is displayed.
2. Click on **Open folder to view files**.
 - The file explorer opens.
3. Open the file **testo 184 measurement report.pdf**.
 - The measurement data report is displayed.
 - > Save or print the report as required.

Detailed measurement data analysis

To carry out detailed analysis or to further process readings, the software testo Comfort Software Professional (version 4.3 service pack 2 or later) or testo Comfort Software CFR (version 4.3 service pack 2 of later) is required (accessory). Please consult the relevant software instruction manual.

Measurement data output via NFC

The data loggers are equipped with an NFC (Near Field Communication) transmitter. This allows instrument data to be read out via short-range radio using compatible devices (for example a report printer or smartphone with NFC).

- The NFC function on your data logger can be enabled/disabled in the configuration file.
- The NFC function on your smartphone must be enabled.
- To transfer the data to a smartphone you need the app **testo 184 NFC**, which you can download from the Google Play Store: <https://play.google.com/store/apps/details?id=com.testo.app184>
- You do not need any additional software to transfer data to a compatible Testo report printer (e.g. mobile printer for data loggers 0572 0576).
- To transfer data, the data logger must be placed on the NFC transmitter () of the target device.
- Please also consult the instruction manual for the target device.

5 Maintaining the product

5.1. Changing the batteries

It is not possible to change the batteries for instrument types T1 and T2 (single-use data loggers).

i A battery change stops a measurement that is currently running. However, stored data is preserved.

1. Read out stored data.
 2. Place the data logger on its front.
 3. Open the battery compartment on the back of the data logger by turning anti-clockwise. Use a coin for this purpose.
 4. Take the spent battery out of the battery compartment.
 5. Insert new batteries (see technical data for type required) into the instrument so that the positive terminal is visible.
-

i Only use new branded batteries. If a partially exhausted battery is inserted, the battery capacity will not be calculated correctly.

6. Place the battery compartment cover on the battery compartment and close it by turning clockwise. Use a coin for this purpose.
 - The data logger is in reset mode, **rSt** is illuminated (instruments with display), status LEDs are disabled.
7. Reconfigure the data logger, see the section Configuring the data logger.

5.2. Cleaning the instrument

CAUTION

Damage to the sensor!

> Ensure that no liquid enters the inside of the housing.

> If the housing of the instrument is dirty, clean it with a damp cloth.

Do not use any aggressive cleaning agents or solvents! Weak household cleaning agents or soap suds can be used.

6 Tips and assistance

Questions and answers

| Question | Possible causes/solution |
|--|--|
| E0x is displayed (instruments with display), all status LEDs are flashing red | An error has occurred. <ul style="list-style-type: none"> • E01: configuration unsuccessful. • E02, E03, E04 or E05: sensor faulty. • E06: maximum number of time marks set, new time mark cannot be set. |
| ---- is displayed (instruments with display) | <ul style="list-style-type: none"> • No reading available (after setting a time mark) • Reading invalid. |
| Hi is displayed (instruments with display) | Reading is above the measuring range. |
| Lo is displayed (instruments with display) | Reading is below the measuring range. |
| En is displayed (instruments with display) | Set time marks function is disabled. |
| Err is displayed (instruments with display) | Configuration not possible, e.g. because Rec mode is active. |
| The size of the PDF configuration file is 0 kB or the file is damaged. | Please download the configuration file from the Testo website: http://www.testo.com/ |
| No measurement protocol was created. | <ul style="list-style-type: none"> > Please check whether the data logger is in record/end mode. > Please reconnect the data logger to the PC. > Please check whether there is enough free memory capacity available on the data logger. |

| Question | Possible causes/solution |
|--|--|
| The PDF configuration is not ready for use. | <ul style="list-style-type: none"> > Please check whether the data logger is in record mode. > Please check whether the correct data logger mode is selected. > Please check whether the data logger was configured through CFR 21. |
| There is no LCD display. | Please check whether the LCD display is disabled in the configuration. |
| There is no LED display. | Please check whether the LED display is disabled in the configuration. |
| There is no time mark display. | Please check whether the time mark display is disabled in the configuration. |
| There is no NFC. | Please check whether the NFC display is disabled in the configuration. |
| The humidity value measured is out of tolerance. | <ul style="list-style-type: none"> a Was the t99 response time achieved? b Was the H1/G1 data logger stored for longer than 60 hours at a relative humidity of more than 80% without an airtight bag? c Was the H1/G1 data logger used for longer than 60 hours at a relative humidity of more than 80%? <p>Solution for points b and c:</p> <ul style="list-style-type: none"> > Store the device for 12 hours at 50°C and a relative humidity of less than 20%. <p>or</p> <ul style="list-style-type: none"> > Store the device for 12 hours at 20°C to 30°C and a relative humidity of around 75%. |

If you have any questions please contact your local dealer or the Testo Customer Service. Contact details can be found on the internet: www.testo.com/service-contact

